PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 728409	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/AU2004/001274	International filing date *(day/month/year)* 17 September 2004	Priority date *(day/month/year)* 18 September 2003

International Patent Classification (IPC) or national classification and IPC

Int. Cl. ***F16K 17/38*** (2006.01) ***F24H 9/20*** (2006.01)
F16K 31/70 (2006.01) ***G05D 23/02*** (2006.01)

Applicant

GSA INDUSTRIES (AUST.) PTY LTD et al

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. [X] *(sent to the applicant and to the International Bureau)* a total of **13** sheets, as follows:
      - [ ] sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      - [ ] sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. [ ] *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - [X] Box No. I Basis of the report
   - [ ] Box No. II Priority
   - [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - [ ] Box No. IV Lack of unity of invention
   - [X] Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - [ ] Box No. VI Certain documents cited
   - [ ] Box No. VII Certain defects in the international application
   - [ ] Box No. VIII Certain observations on the international application

Date of submission of the demand 29 April 2005	Date of completion of this report 13 January 2006
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/AU2004/001274

Box No. I Basis of the report

1. With regard to the **language**, this report is based on:

[X] The international application in the language in which it was filed

[ ] A translation of the international application into , which is the language of a translation furnished for the purposes of:

- [ ] international search (under Rules 12.3(a) and 23.1 (b))
- [ ] publication of the international application (under Rule 12.4(a))
- [ ] international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

[ ] the international application as originally filed/furnished

[X] the description:

pages **1, 9 - 11** as originally filed/furnished
pages* **2 to 8, 8a, 8b** received by this Authority on **29 April 2005** with the letter of **29 April 2005**
pages* received by this Authority on with the letter of

[X] the claims:

pages as originally filed/furnished
pages* as amended (together with any statement) under Article 19
pages* **12 - 15** received by this Authority on **29 April 2005** with the letter of **29 April 2005**
pages* received by this Authority on with the letter of

[X] the drawings:

pages **1 - 2** as originally filed/furnished
pages* received by this Authority on with the letter of
pages* received by this Authority on with the letter of

[ ] a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. [ ] The amendments have resulted in the cancellation of:

- [ ] the description, pages
- [ ] the claims, Nos.
- [ ] the drawings, sheets/figs
- [ ] the sequence listing *(specify)*:
- [ ] any table(s) related to the sequence listing *(specify)*:

4. [ ] This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- [ ] the description, pages
- [ ] the claims, Nos.
- [ ] the drawings, sheets/figs
- [ ] the sequence listing *(specify)*:
- [ ] any table(s) related to the sequence listing *(specify)*:

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims 2 - 22	YES
	Claims 1	NO
Inventive step (IS)	Claims	YES
	Claims 1 - 22	NO
Industrial applicability (IA)	Claims 1 - 22	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

D2: US 5024378 A (BERGMANN et al) 18 June 1991
D3: US 4281790 A (McGINNIS) 4 August 1981
D4: US 4480784 A (BENNETT) 6 November 1984
D5: WO 1997/021949 (PIZZEY) 19 June 1997
D7: WO 1993/002308 A (GSA INDUSTRIES (AUST) PTY LTD) 4 February 1993

NOVELTY(N): Claim 1

D7 discloses a tempering valve which mixes hot and cold water in a valve having a thermostatically controlled closure member. It further discloses fail-safe means 149; see figures 7 – 9 which functions to shut-off escape of water from the outlet 104.

Thus the features of Claim 1 i.e. the combination of a liquid mixing valve and a safety valve are disclosed.

Claim 1 thus lacks novelty..

INVENTIVE STEP (IS): Claims 1 – 22

Claim 1 : as above

Claim 1 is further not inventive in light of the combined disclosure of D7 and either D3 or D4 as it would be obvious to attach or combine a safety valve as disclosed in D3 or D4 with the liquid mixing valve of D7.

Claims 2 – 21 are not inventive in light of D7 or D5 combined with D2. Each of D7 and D5 disclose a liquid mixing valve where the mixed water temperature is controlled by a thermostatic element. D2 discloses a safety valve having a thermostatic element that shifts a shut-off device to substantially shut off flow upon the water temperature exceeding a given temperature. It would be obvious for the person skilled in the art to combine the valves of these documents to arrive at the liquid mixing valve and safety valve combination defined by the above claims. Features in subsidiary claims 3 to 21 are either explicitly disclosed and can be obvious from a combination of the documents or are minor features not amounting to inventive step.

Claim 22: The features of this claim only include the liquid mixing valve of D7 or D5 and D2 in the environment of a water supply including a storage and heater means which is not considered to involve an inventive step as it would be obvious to the skilled addressee to employ such a valve in the defined assembly.

The expandable element of the thermostatic valve is operable to alter the proportions of hot and cold water which are mixed together, by expanding toward and away from inlet ports provided for entry of the respective hot and cold water into a mixing chamber. If the temperature in the mixing chamber exceeds the predetermined set temperature of the mixed outlet water, then the expandable element is such as to expand or contract in a manner which constricts the flow of hot water into the mixing chamber and/or in a manner to increase the amount of cold water which flows into the mixing chamber. By reducing or increasing the respective proportions of hot or cold water which enter the mixing chamber, the temperature of the mixed water which proceeds to the valve outlet, can be relatively accurately controlled.

Because the thermostatic valve employs a movable element for temperature control, the possibility exists that the element could jam or otherwise fail and if the valve arrangement is such that failure of the element would significantly increase the outlet temperature of water from the valve, then the potential also exists that the water user would be exposed to a water temperature which is significantly higher than expected. This could be dangerous for the user, particularly if element failure occurred during supply of hot water, rather than at the commencement of hot water supply.

It is an object of the present invention to attend to or at least alleviate disadvantages associated with existing hot water delivery arrangements. It is a further object of the invention to provide a valve arrangement which protects an end user against unexpected delivery of high temperature water.

According to the present invention there is provided a liquid mixing valve, said mixing valve including a first inlet for receiving heated water from a water heater, a second inlet for receiving non-heated water from a water supply, a mixing chamber for mixing water from said first and second inlets and a discharge outlet for discharge of said mixed water from said mixing chamber, a first thermostatic element being disposed within said mixing chamber for controlling the proportions of heated and non-heated water that are mixed within said mixing chamber so that the temperature of the mixed water which is

discharged from said mixing chamber does not exceed a predetermined upper temperature and whereby, upon increase of the temperature of the mixed water in the mixing chamber above the predetermined upper temperature, the first thermostatic valve is operable to substantially terminate the flow of water through said discharge outlet, said liquid mixing valve further including a safety valve which includes an inlet in communication with said discharge outlet, an outlet, and a flow passage for flow of liquid therebetween, a second thermostatic element disposed in the flow passage and reactable to expand or contract relative to the temperature of liquid flowing past it, a shut off device which is movable with expansion or contraction of the second thermostatic element, the second thermostatic element being operable to shift the shut off device to a shut off position to substantially terminate flow of liquid through the outlet of the safety valve upon failure of the first thermostatic element to substantially terminate flow of water through the discharge outlet when the temperature of the water in the mixing chamber exceeds the predetermined temperature.

The present invention also provides a water delivery system, including a water supply, a water heater and a liquid mixing valve, said water heater including a tank having an inlet for receiving water from said water supply and an outlet for discharge of heated water, said liquid mixing valve including a first inlet for receiving heated water from a water heater, a second inlet for receiving non-heated water from a water supply, a mixing chamber for mixing water from said first and second inlets and a discharge outlet for discharge of said mixed water from said mixing chamber, a first thermostatic element being disposed within said mixing chamber for controlling the proportions of heated and non-heated water that are mixed within said mixing chamber so that the temperature of the mixed water which is discharged from said mixing chamber does not exceed a predetermined upper temperature and whereby, upon increase of the temperature of the mixed water in the mixing chamber above the predetermined upper temperature, the first thermostatic valve is operable to substantially terminate the flow of water through said discharge outlet, said liquid mixing valve further including a safety valve which includes an inlet in communication with said discharge outlet, an outlet, and a flow passage for flow of liquid

therebetween, a second thermostatic element disposed in the flow passage and reactable to expand or contract relative to the temperature of liquid flowing past it, a shut off device which is movable with expansion or contraction of the second thermostatic element, the second thermostatic element being operable to shift the shut off device to a shut off position to substantially terminate flow of liquid through the outlet of the safety valve upon failure of the first thermostatic element to substantially terminate flow of water through the discharge outlet when the temperature of the water in the mixing chamber exceeds the predetermined temperature.

A valve according to the present invention is principally envisaged to be used in relation to hot water supply systems. Accordingly, while the valve could be used for many different liquids, further discussion will relate to its use with water supply only.

In a liquid mixing valve according to the present invention the safety valve receives water in series from the mixing chamber and is operable to allow passage of that water therethrough while the temperature of the water remains within a preset range which is deemed to be acceptable for end use purposes.

When an event occurs such that the water which is received at the safety valve from the mixing chamber is above a predetermined temperature, the second thermostatic element will expand, thereby shifting the shut off device toward a flow restricting position in which flow of water through the safety valve is substantially reduced. This may be termed "the operational safety mode". By this mechanism if a failure occurs at the first thermostatic element which results in non-tempered high temperature hot water to be released through the discharge outlet, that hot water flow is substantially terminated at the safety valve by operation of the second thermostatic element of the safety valve. As a consequence, the danger to an end user is removed by substantial termination of hot water flow.

It is preferred that the shut off device does not completely terminate flow of hot water in the event of a suitable failure and resultant operation of the safety

valve. This is partly to ensure that the second thermostatic element is not damaged by limiting the amount it can expand. If the shut off device was to completely terminate water flow, that arrangement is likely to require that device to abut against a valve seat or the like. While such abutment could adequately terminate flow completely, if the temperature to which the second thermostatic element was exposed continued to increase, that element would tend to continue to expand, but if it was restrained against further expansion by an absence of further available movement in the shut off device, then the element itself may be damaged.

It is further preferred to allow a small leakage flow of hot water in the operational safety mode, because the failure of the mixing valve may be temporary only, so that upon resumption of mixed water production of the correct or an acceptable temperature, the second thermostatic element will contract by exposure to reduced temperature water, thereby withdrawing the shut off device from its position of flow restriction and allowing recommencement of normal water flow.

Still further, a small flow past the second thermostatic element in the operational safety mode will ensure that the shut off device is maintained in the position of flow restriction, because the thermostatic element will continue to be exposed to hot water which is above the predetermined temperature.

It is to be noted that the desirability of continued hot water leakage flow through the safety valve is only a desirable function of the valve when a failure occurs and in the immediate time period thereafter. After this, the hot water system normally would be shut down fully for maintenance prior to recommencement of hot water supply.

Alternatively, it is to be appreciated that the shut off device may be designed such that the flow of hot water terminates without leakage.

The shut off device may be activated permanently to a shut condition, for example, by using a spring loaded clip or other suitable device. This is so that the shut off device does not return to water flow in circumstances when there is

an inherent fault in the hot water system that requires fixing. Permanent activation can be automatic, on operation of the safety valve, or it can be manually activated.

In a preferred arrangement, the liquid mixing valve is elongate, defining an inlet and an outlet at opposite ends thereof. In one arrangement, the inlet of the safety valve is formed for connection to the discharge outlet of the mixing valve along an axial alignment and that connection can take any form, such as snap connection or threaded connection. Alternatively, the safety valve may be connected integrally with the discharge outlet, such as an integral metal or plastic casting.

In the above elongate form of the mixing valve, the safety valve may define an axial flow passage for axial water flow between its inlet and its outlet. The flow path may have any suitable cross-section, but preferably is circular in cross-section, although the cross-sectional diameter may change lengthwise of the flow path.

The shut off device can take any suitable form and in one preferred form, includes a piston which is arranged in the proximity of a valve seat, for movement toward and away from that seat. Movement toward the seat is such as to restrict the flow of water through the safety valve, while movement away from the valve has the effect of increasing water flow. As discussed above, actual engagement with the valve seat is not necessarily desirable. For this, the piston may be arranged to be a close fit with the seat, but not an engaging or abutting fit.

In one arrangement, the shut off device includes a piston which is circular in cross-section and arranged for receipt within a seat which defines a complementary shaped opening, with the opening being of slightly greater diameter than the external diameter of the piston, so that the piston can enter the opening to throttle flow of water through the opening, but effectively to allow a small leakage of water past the piston for the reasons explained earlier.

In an alternative arrangement, the piston may closely approach an opening through which water flow would normally take place, with the level of restriction to water flow being dependent on the closeness of approach of the piston to the opening. Still alternatively, the piston may be arranged to shift across an opening, with the level of restriction to water flow being dependent on the extent to which the piston extends across the opening. In each of these alternatives, the arrangement can be such as to fully restrict water flow, or to allow water leakage following substantial restriction of water flow.

In the preferred arrangement, the shut off device includes a cylindrical piston which is tapered at one end to define a frustoconical end portion. The piston is disposed in the flow passage, in a portion of that passage that forms a piston chamber having a valve seat at one end and the piston is arranged for movement toward and away from the seat. The frustoconical end portion provides for a more gradual cessation of flow through the safety valve if failure of the mixing valve results in a slow increase in the temperature of water entering the safety valve, rather than a sudden increase. However, a piston of this kind nevertheless is operable for generally instant or sudden shut off, if the temperature increase of the water occurs suddenly.

The piston preferably is biased towards an open position, displaced from the opening or the valve seat to allow generally unrestricted flow of water through the safety valve. This biasing influence may be required more to ensure return of the piston to the displaced position following movement of the piston towards the valve seat in the operational safety mode, rather than to maintain the piston in that displaced position. In the preferred arrangement, movement of the piston toward the seat is against the flow of water through the safety valve and the piston therefore experiences a force during normal operation under non-failure conditions that tends to push the piston away from the seat. For this reason, it can be acceptable for the biasing means to be omitted with the water pressure maintaining the piston in the open position. However, the invention also includes an arrangement in which movement of the piston in the operational safety mode is in the direction of water flow, and in that arrangement, the biasing load would maintain the piston displaced from the

valve seat in non-failure conditions. A suitable biasing arrangement for either alternative could include a coil spring mounted in compression, to act on the piston. Each of the piston and the wall of the flow passage can include a suitable flange or step to locate the spring ends.

The second thermostatic element can take any suitable form and preferably includes an outer casing which encloses a thermally reactive material and which is mounted in the flow passage and a plunger that extends from the casing in engagement with the piston. The engagement can be fixed or loose. If the engagement is fixed, then the piston will move with the plunger forward and back. However if the engagement is loose, then the plunger will be operable to push the piston, but either water pressure, spring pressure, or other means is required for return movement. The plunger is movable relative to the casing dependent on expansion or contraction of the thermally reactive material. The thermally reactive material can be elongate and coaxial with the piston. The thermally reactive material may include, but is not limited to bimetallic strips, wax, mercury or alcohol based liquids.

The attached drawings show an example embodiment of the invention of the foregoing kind. The particularity of those drawings and the associated description does not supersede the generality of the preceding broad description of the invention.

Figure 1 is a layout drawing illustrating a liquid mixing valve according to the present invention.

Figure 2 shows the liquid mixing valve of Figure 1 in larger detail.

Referring to Figure 1, a hot water storage facility 10 is shown, which has an inlet pipe 11 and an outlet pipe 12. The inlet pipe 11 provides a supply of cold water, and the pipe 11 branches into further pipes 13 and 14, with pipe 13 extending to the storage facility 10 and pipe 14 extending to a thermostatic liquid mixing valve 15.

Cold water is supplied through the inlet pipe 13, to the storage facility 10, where it is heated to an elevated temperature. When hot water is required, it is taken from the storage facility 10 through the outlet pipe 12 for flow through the mixing valve 15. The liquid mixing valve 15 is operable to mix the hot water received through the inlet 16, with cold water received through the pipe 14 at the inlet 17. The mixing valve 15 is operable to mix appropriate quantities of hot and cold water to ensure that water which is discharged from the valve 15 through the outlet 18 is at or about a predetermined temperature of about 50°C or below. The temperature of water being discharged through the outlet 18 is therefore greatly reduced compared to the temperature of water within the storage facility 10, and that reduction in temperature is essential, so that the end user is not exposed to dangerously high temperature water. The valve 15 is shown to be a thermostatic mixing valve, in which a thermostatic element 19 is operable to control the proportions of hot and cold water which are mixed together and discharged through the outlet 18.

It will be appreciated that the layout shown in Figure 1 shows the various pipes 11 to 14 and the valve 15 in greatly disproportionate scale. Likewise, it is further the case that the thermostatic safety valve 20 is also shown disproportionately large.

It will be clear from Figure 1, that water discharged through the outlet 18 of the mixing valve 15, is directed into an inlet 21 of the safety valve 20. In this figure, the mixing valve 15 is shown separated from the safety valve 20, however in practice the two valves are joined together or are formed integrally. The inlet 21 is formed in a first body section 22 of the valve 20, which is shown in threaded connection at 23, with a second body section 24. As shown, the body sections 22 and 24 are coaxial and form an elongate valve body 25.

CLAIMS:

1. A liquid mixing valve, said mixing valve including a first inlet for receiving heated water from a water heater, a second inlet for receiving non-heated water from a water supply, a mixing chamber for mixing water from said first and second inlets and a discharge outlet for discharge of said mixed water from said mixing chamber, a first thermostatic element being disposed within said mixing chamber for controlling the proportions of heated and non-heated water that are mixed within said mixing chamber so that the temperature of the mixed water which is discharged from said mixing chamber does not exceed a predetermined upper temperature and whereby, upon increase of the temperature of the mixed water in the mixing chamber above the predetermined upper temperature, the first thermostatic valve is operable to substantially terminate the flow of water through said discharge outlet, said liquid mixing valve further including a safety valve which includes an inlet in communication with said discharge outlet, an outlet, and a flow passage for liquid therebetween, a second thermostatic element disposed in the flow passage and reactable to expand or contract relative to the temperature of liquid flowing past it, a shut off device which is movable with expansion or contraction of the second thermostatic element, the second thermostatic element being operable to shift the shut off device to a shut off position to substantially terminate flow of liquid through the outlet of the safety valve upon failure of the first thermostatic element to substantially terminate flow of water through the discharge outlet when the temperature of the water in the mixing chamber exceeds the predetermined temperature.

2. A liquid mixing valve according to claim 1, said flow passage extending axially between said inlet and said outlet.

3. A liquid mixing valve according to claim 2, said flow passage being circular in cross-section.

4. A liquid mixing valve according to claim 3, wherein the diameter of said flow passage changes through the length of said flow passage.

5. A liquid mixing valve according to any one of claims 1 to 4, said shut off device including a piston which is positioned in proximity of an opening of said flow passage, for movement toward and away from said opening.

6. A liquid mixing valve according to claim 5, said piston being arranged to closely approach said opening.

7. A liquid mixing valve according to claim 5, wherein said opening has a valve seat formed about it and said piston can move into engagement with said valve seat to close said opening.

8. A liquid mixing valve according to any one of claims 5 to 7, wherein said piston is generally cylindrical and includes a conical or frustoconical axial end portion in facing relationship with said opening.

9. A liquid mixing valve according to any one of claims 1 to 4, said shut off device including a piston which is circular in cross-section and is arranged for receipt within a circular opening formed in said flow passage, said circular opening having a slightly greater diameter than the external diameter of said piston so that said piston can enter said opening to restrict flow of water through said opening without fully closing said opening.

10. A liquid mixing valve according to claim 9, wherein said piston includes a frustoconical axial end portion in facing relationship with said opening.

11. A liquid mixing valve according to any one of claims 1 to 4, said shut off device including a piston which is positioned in proximity to an opening formed in said flow passage, said piston being arranged for movement across said opening to restrict flow of water through said opening.

12. A liquid mixing valve according to any one of claims 1 to 11, wherein when said shut off device has moved to substantially restrict flow of liquid through said outlet of said safety valve, said shut off device allows a small amount of liquid to continue to flow past said thermostatic element.

13. A liquid mixing valve according to any one of claims 1 to 4, wherein said shut off device includes a piston and biasing means to bias said piston to a position allowing generally unrestricted flow of liquid through said safety valve.

14. A liquid mixing valve according to any one of claims 1 to 4, wherein said shut off device includes a piston which is positioned so that flow of liquid through said flow passage acts on said piston in a direction tending to shift said piston to a position allowing generally unrestricted flow of liquid through said safety valve.

15. A liquid mixing valve according to any one of claims 1 to 4, wherein said shut off device includes a piston which is positioned so that flow of liquid through said flow passage acts on said piston in a first direction tending to shift said piston to a position to substantially restrict flow of liquid through said flow passage, and biasing means are provided to bias said piston in a second and reverse direction.

16. A liquid mixing valve according to claim 15, said biasing means being a coil spring mounted in compression to act on said piston.

17. A liquid mixing valve according to any one of claims 1 to 4, said second thermostatic element including an outer casing, a thermally reactive material within said casing, and a plunger, the plunger being movable upon expansion or contraction of said thermally reactive material, said shut off device including a piston and said plunger being in engagement with said piston to shift said piston upon expansion or contraction of said thermally reactive material.

18. A liquid mixing valve according to claim 17, said engagement being fixed engagement.

19. A liquid mixing valve according to claim 17, said engagement being abutting engagement.

20. A liquid mixing valve according to any one of claims 17 to 19, said casing being fixed against movement within said flow passage.

21. A liquid mixing valve according to any one of claims 1 to 20 said mixing valve being elongate and defining an axial flow passage between one of said first and second inlets, said discharge outlet, said inlet of said safety valve and said outlet of said safety value.

22. A water delivery system, including a water supply, a water heater and a liquid mixing valve, said water heater including a tank having an inlet for receiving water from said water supply and an outlet for discharge of heated water, said liquid mixing valve including a first inlet for receiving heated water from a water heater, a second inlet for receiving non-heated water from a water supply, a mixing chamber for mixing water from said first and second inlets and a discharge outlet for discharge of said mixed water from said mixing chamber, a first thermostatic element being disposed within said mixing chamber for controlling the proportions of heated and non-heated water that are mixed within said mixing chamber so that the temperature of the mixed water which is discharged from said mixing chamber does not exceed a predetermined upper temperature and whereby, upon increase of the temperature of the mixed water in the mixing chamber above the predetermined upper temperature, the first thermostatic valve is operable to substantially terminate the flow of water through said discharge outlet, said liquid mixing valve further including a safety valve which includes an inlet in communication with said discharge outlet, an outlet, and a flow passage for liquid therebetween, a second thermostatic element disposed in the flow passage and reactable to expand or contract relative to the temperature of liquid flowing past it, a shut off device which is movable with expansion or contraction of the second thermostatic element, the second thermostatic element being operable to shift the shut off device to a shut off position to substantially terminate flow of liquid through the outlet of the safety valve upon failure of the first thermostatic element to substantially terminate flow of water through the discharge outlet when the temperature of the water in the mixing chamber exceeds the predetermined temperature.